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The terminology and identification phase of a project on minimal brain dysfunction in children is described. Two subsequent phases are to deal with services and research. Included in the first phase are the following: an introduction to the problem, history and blueprint of the project, a brief history of the concept of minimal brain dysfunction, clarification of central issues, nomenclature, symptomatology, identification of the child, diagnostic evaluation and criteria, and 124 references. Specific listings and outlines are provided for several areas. (AP)

NINDB MONOGRAPH NO. 3

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Terminology and Identification
Phase One of a Three-Phase Project

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Minimal Brain Dysfunction in Children

Terminology and Identification
Phase One of a Three-Phase Project

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Foreword

Deviations in nervous system function may lead to a wide variety of disabilities. These range in severity from the most subtle alteration of complex thought process to the grossest mental and motor disability. Their nature depends upon the individual's basic inheritance, the impact on his nervous system of any deleterious prenatal or postnatal factors, and the age at which such factors may have been operative. The effect of such deviations is markedly influenced by interaction of the child with his physical and social environment and by his training and education.

This report is the first of a series on the special medical and educational needs of that group of children whose dysfunction does not produce gross motor or sensory deficit or generalized impairment of intellect, but who exhibit limited alterations of behavior or intellectual functioning. The early recognition and adequate evaluation of such children is important because they require special forms of management and education if they are to develop to their fullest potential.

Richard L. Masland

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JANUARY 1966

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I. Introduction to the Problem

A large number of individuals within our population show deviations of intellect and behavior of such a nature as to require special resources for their management and education. The concept of brain dysfunction as a primary causative factor in these learning and behavioral disorders of children has received increasing attention over the past 20 years. This concept has attained particular prominence in the fields of medicine, psychology, education, and the language specialties.

The current extensive concern for, awareness of, and interest in children with minimal brain dysfunction is not restricted to the professional groups who work with and for children. Indeed, the stirrings of discontent have been intensified by parents of such children. Parents alone, or more recently through organized local, State, and National groups, have demanded increased public and professional acknowledgment of this host of handicapped youngsters. Parents want services to aid each such child to develop to his potential; they have appealed for specialized academic training for professional groups, to give such services effectively.

Few subject areas have occasioned such wide multidisciplinary concurrence and collaboration while simultaneously provoking professional disjunction and discord. In fact, the role of brain injury within this broad constellation of physical, intellectual, and behavioral deviations has not been determined with precision.

The educators and, in particular, the elementary classroom teachers must provide programs for such individuals, regardless of the exact cause of their disability. In some instances this situation has led to hastily conceived public school programing, involving a considerable expenditure of money, with inadequate provisions and criteria for student selection, teacher training requirements, program supervision, and evaluation.

Educators cannot defer dealing with the educational disabilities of these children or the behavioral disturbances they frequently display pending scientific clarification of the issues.

The rise in the number of so-called "children with minimal brain dysfunction" may, in part, be explained on the basis of one or more of the following factors:

1. The increased refinement in diagnostic techniques and skills over the last several years.

2. The growing necessity for more precise classification of the learning and behavioral disorders of children. The usefulness of statistical data for such purposes as reporting to central agencies, program planning, and research depends on precise classification. This is particularly true of outpatient child guidance clinics. In these clinics, there is a general agreement that the standard psychiatric nosology as outlined in the Diagnostic and Statistical Manual of the American Psychiatric Association (1952), is unsatisfactory and, for the most part, inappropriate for use with children. (It was developed mainly for the classification of adult disorders.)

3. An apparent increase in the number of children compromised by neurologic dysfunctions, which, unfortunately, is often the unintentional aftermath of advances in medical knowledge and care.

4. A growing dissatisfaction on the part of many medical workers with children with purely psychogenic and interpersonal explanations for any disorganized or poorly understood behavior.

A commonly expressed concern of both professionals and parents is the general lack of knowledge, understanding, and agreement in the broad area of minimal brain dysfunction among the clinicians who are accountable for the diagnosis and treatment of deviating children.

The concept of minimal brain dysfunctions in children and the implications for child psychiatry, child

psychology, education, legislative action, neurology, pediatrics, rehabilitation, and research, have top priority with parents and professional persons. The National Institute of Neurological Diseases and Blindness, and the National Society for Crippled Children and Adults, Inc., provided the initiative for clarification of the issues involved and the development of a blueprint for action.

The following document presents one segment of this collaborative effort.

II. History and Blueprint of the Project

On August 22, 1963, a steering committee meeting to develop a symposium on the "Child with Minimal Brain Dysfunction" was held in Washington, D.C. It was sponsored by the National Society for Crippled Children and Adults, Inc., in cooperation with the Neurological and Sensory Diseases Service Program of the Division of Chronic Diseases, U.S. Public Health Service.

The group was in accord that considerable thought and planning must precede a high-level symposium on this complex subject. It was agreed that small groups (task forces) should meet to work on specific aspects of the general subject of the child with minimal brain dysfunction. Suggestions included a subcommittee on terminology and identification, a classification of criteria for diagnosis, a survey of the magnitude of the problem, and a listing of available facilities for diagnosis, therapy, education, and rehabilitation. Various methods of financing such a project were discussed.

On October 10, 1963, a meeting of the Committee on Task Forces was held in Chicago, Ill., sponsored by the National Society for Crippled Children and Adults, Inc. The following individuals attended: Edward Lis, M.D.; Helmer Myklebust, Ed. D.; Ward Halstead, Ph. D.; Meyer Perlstein, M.D.; Ralph H. Kunstadter, M.D.; William Gellman, Ph. D.; Miss Jayne Shover. The purpose of the session was to delineate the objectives of the task forces as recommended at the Washington conference and to consider their membership.

The task forces were profiled as follows:

Task Force I—Terminology and Identification
- Define problem.
- Suggest nomenclature.
- Identify child.
- Delineate relationship of this problem to other handicaps.
- Outline diagnostic criteria.

Task Force II—Services
- Extent of need:
- For medical diagnosis and treatment.
- For identification of educational capabilities and methods of educating afflicted children.
- Availability: In medical centers? In public schools?
- What services from a practical viewpoint should be made available?
- What should a public information program include to acquaint the community with the problem?

Task Force III—Research
- Applied research.
- Basic research.

In July 1964, the National Society for Crippled Children and Adults, Inc., and the National Institute of Neurological Diseases and Blindness, of the National Institutes of Health, agreed to cosponsor Task Forces I and III. The Society and the Neurological and Sensory Disease Service Program are cosponsoring Task Force II in cooperation with the Office of Education.

These members of the Task Force I Committee and a Project Director were named in August 1964:

Richmond S. Paine, M.D., Children's Hospital and George Washington University School of Medicine, Washington, D.C.—Committee Chairman.

Herbert G. Birch, M.D., Ph. D., professor of pediatrics, Albert Einstein College of Medicine, New York, N.Y.

Raymond L. Clemmens, M.D., Department of Pediatrics, University of Maryland School of Medicine, Baltimore, Md.

Leon Eisenberg, M.D., professor of child psychiatry, Johns Hopkins University, Baltimore, Md.

Ralph H. Kunstadter, M.D., chairman, Professional Advisory Council, National Society for Crippled Children and Adults, Inc., Chicago, Ill. (ex officio).

Edward Lis, M.D., professor of pediatrics, University of Illinois, Chicago, Ill.

Richard L. Masland, M.D., Director, National Institute of Neurological Diseases and Blindness, National Institutes of Health, Bethesda, Md.

Helmer Myklebust, Ed. D., director, Institute for Language Disorders, Northwestern University, Evanston, Ill.

Beale Ong, M.D., consultant in pediatric neurology, Neurological and Sensory Disease Service Program, U.S. Public Health Service, Washington, D.C.

John E. Peters, M.D., professor of psychiatry, University of Arkansas Medical Center, Little Rock, Ark.

Miss Jayne Shover, associate director, National Society for Crippled Children and Adults, Inc., Chicago, Ill. (ex officio).

Sam D. Clements, Ph. D., associate professor, Departments of Psychiatry and Pediatrics, University of Arkansas Medical Center, Little Rock, Ark.—project director.

A grant from the Easter Seal Research Foundation to cover the expenses of the Committee members of Task Force I was awarded for administrative handling to George Washington University, Washington, D.C. The project director was appointed a consultant to the National Institute of Neurological Diseases and Blindness.

October 1, 1964, was the target date for the official launching of the project.

III. A Brief History of the Concept of Minimal Brain Dysfunction

The literature on minimal brain dysfunction prior to 1920 is sparse and is generally concerned with observations on individuals who sustained damage to the brain after reaching adulthood.

Several early references describe "nervous conditions" in children which affect learning and behavior (1, 2).

Many papers appearing during the period between the two World Wars can be considered as the descriptive forerunners of certain aspects of minimal brain dysfunction. Of particular importance are the contributions of Kramer and Pollnow (3); Kahn and Cohen (4); Bender (5, 6); Goldstein and Scheerer (7); Goldstein (8); Orton (9). A large number of references are devoted to the linkage between specific etiologic agents and resultant changes in behavior and learning abilities (10–21).

The early work of Gesell and Amatruda (22); Werner and Strauss (23); Werner and Thuma (24); Werner and Weid (25); Strauss and Werner (26); Strauss (27) sets the stage for the concepts of brain dysfunction in children and the child with minimal brain dysfunction as they are presently constituted. The classic work of Strauss and Lehtinen (28) became the first comprehensive presentation on the topic and is the reference most frequently cited by subsequent authors. As is the case with many pioneering works, it represented the essence of 20 years of foregoing study. In the light of the subsequent expansion of the concepts the study may appear fragmentary. Mindful of this, and perhaps anticipating reproving response, Strauss and Kephart acknowledged the need for alterations in theories and applications as new data accumulated (29).

Nonetheless, few single volumes have been so influential in the production of fresh considerations in the areas of pathology, diagnosis, education, and investigation of children with learning and behavioral disabilities. It refocused attention on the neglected area of *individual differences* among children. It also is an excellent illustration of the usefulness of collaboration on a problem area.

Since 1950, the literature has become increasingly loaded with clinically oriented articles and studies of the disabilities under the general concept of minimal brain dysfunction in children.

The recent volume edited by Birch (30); the comprehensive review of mental subnormality by Masland, Sarason, and Gladwin (31); and recent standard texts of child psychology, neurology, pediatrics, and psychiatry obviate an extensive review of the literature for this particular paper.

IV. Toward Clarification of Central Issues

Several basic issues impede agreement on the concepts of "brain dysfunction" and the "child with minimal brain dysfunction." They come from our incomplete knowledge of the human organism, our communication failures, and our personal biases. Any serious attempt at solution must at least acknowledge these issues.

The Organicity-Environment Obstacle

One issue is the age-old dilemma: Organicity vs. environment. This conflict, which is reminiscent of the heredity-environment controversy, represents an updating and expansion of its predecessor.

The concept of organicity has been broadened to include all factors which originate in or are inherent in pathology, including genetic variations, biochemical irregularities, perinatal brain insults, or the results of illnesses and injuries sustained during the years critical for the normal development and maturation of the central nervous system.

Included in the organicity concept is the proposition that any condition which alters normal functioning can manifest itself as learning and behavioral irregularities. These irregularities depend upon such factors as causes, loci of the assault, developmental stage of embryo, fetus, or child, and diffuseness or discreteness of the damage to the central nervous system (CNS).

The concept of environment would consider all factors related to the normal life experiences inherent in the social-economic-cultural milieu of the individual, his interpersonal relationships, and his personal psychological traumata and stresses. Included is an appreciative regard for the part such elements could play in the production of learning and behavioral irregularities.

Assuming agreement that the two major determinants of learning and behavior are organicity and environment, the diagnostic team must determine, as accurately as possible, the amount of impairment each is contributing to the chief complaints about the child and to his clinical symptoms.

If the "whole child" approach to diagnosis is deemed essential to the earnest understanding of a "difficult" youngster, then equal weight, in terms of symptom antecedents and investigatory priority, must be given to both organicity and environment.

Although organicity is often recognized as a contributor to symptomatology, it is frequently ignored in the final diagnosis of the child, and in the treatment planning, unless it is grossly obvious. The justification offered is our inability to ascertain exactly the extent of its contribution.

Two Differing Points of View

A second clouded issue reflects uncertainty regarding the very existence of a condition such as "minimal brain dysfunction" in the *types of children with which we are dealing*. For convenience, the extreme views will be categorized and labeled according to the sentiments of their proponents.

1. The purist point of view is that "minimal brain dysfunction" is in most instances an unproven presumptive diagnosis. Therefore, the concept can have little meaning and acceptance until such time as our knowledge is greatly increased and our diagnostic skills remarkably refined. Brain dysfunctioning can only be inferred until physiologic, biochemical, or structural alterations of the brain are demonstrated.

2. The pragmatic case might be presented in the following manner: With our limited validated knowledge concerning relationships between brain and behavior, we must accept certain categories of deviant behavior, developmental dyscrasias, learning disabilities, and visual-motor-perceptual irregularities as valid indices of brain dysfunctioning. They represent neurologic signs of a most meaningful kind, and reflect disorganized central nervous system functioning at the

highest level. To consider learning and behavior as distinct and separate from other neurologic functions echoes a limited concept of the nervous system and of its various levels of influence and integration.

We cannot afford the luxury of waiting until causes can be unquestionably established by techniques yet to be developed. We cannot postpone managing as effectively and honestly as possible the large number of children who present chronic differences we feel are more related to organicity variables than others.

The above two views represent the extreme versions of the situation. If clinicians' viewpoints could be plotted, the result would most likely take on the shape of a bimodal distribution with overlapping.

V. Nomenclature

Nomenclature is essential to facilitate communication. Its purpose is to engender mutual understanding. To this end, terminology must define accurately and, in so doing, distinguish clearly one condition from another. To be understood readily, the term must describe the condition.

The task of terminology selection might be simplified if endorsement were required by one group only, e.g., pediatric neurologists. In the case of children with minimal dysfunction the designation must attempt to satisfy the diverse demands of at least four groups:

1. The clinicians (usually involving several disciplines) who diagnose, outline, and execute treatment.

2. The researchers who are concerned with descriptive accuracy, validity, and preciseness of the CNS deviations.

3. Other professional groups who deal with the children and fulfill portions of the treatment plan, e.g., educators.

4. Parents and others who are personally involved with the child.

Disagreement has developed over the use of the term "minimal brain dysfunction" as either a diagnostic or descriptive designation. Historically, the terms "brain-crippled," "brain-injured," and "brain-injured child," were selected by Strauss, Werner, Lehtinen, and others, to describe and account for particular learning and behavioral aberrations in certain children. Other writers, in contributing to or expanding the concept or in describing the condition, used such transitional terms as "brain damage," "brain-damaged child," "brain dysfunction," or "cerebral dysfunction."

Judging from frequency of appearance in the literature, "brain damage" and "brain-damaged child" seem to be the most popular. Although these two terms are the most widely employed, most writers agree that they are unfortunate in that they connote specific demonstrable brain alterations, are unclear, erroneous, too inclusive, or represent a "limited" Straussian view. A proposal for the resolution of the terminology problem was offered several years ago by Stevens and Birch (32).

Over the years, the designation "brain-damaged" has been applied to most children determined to be in the "organic" classifications regardless of responsible agents or symptoms. Thus, if the major overt manifestations of a dysfunctioning brain appear in the motor areas (the cerebral palsies); sensory areas (visual or auditory impairments); mentation or intellect (the mental subnormalities); or as seizures (the epilepsies); the "brain-damaged" label has frequently been applied to the child, especially when related specific learning and behavioral deviations accompany the other primary symptoms. This situation has given rise to the frequent complaint that the term has evolved into an all-embracing "wastebasket" designation.

The problem compounds itself when one considers a partial list of other diverse characteristics which have been attributed to brain variations: infantile autism; childhood schizophrenia; superior intellect; specific talents and abilities in music, art, language, athletics; the aphasias; specific dyslexia; or early and superior reading ability.

In an attempt to establish a continuum of dysfunctioning in any of the areas of brain function, and to distinguish severity of symptoms in one or a combination of these areas, many later authors prefixed the adjective "minimal" to the terms "brain damage," "brain dysfunctions," or "cerebral dysfunction." In the main, these terms were used by their authors to describe milder, borderline, or subclinical abnormal manifestations of motor, sensory, or intellectual function, and to indicate specific kinds of learning, thinking, and behavioral sequelae.

Of major significance is the use of "minimal brain dysfunction" to designate a large group of children whose neurologic impairment is "minimal" (as on a continuum), subtly affecting learning and behavior,

without evident lowering of general intellectual capacity.

Strauss and Lehtinen (28, p. 108 and p. 128) use the terms "minor brain damage," and "minimal brain injury," for this same condition, stating: "Behavior and learning, it is now beginning to be recognized, may be affected by minimal brain injuries without apparent lowering of the intelligence level." The volume by Strauss and Kephart (29) is primarily devoted to this group of youngsters. Gesell and Amatruda (22, p. 240), using the term "minimal cerebral injury," describe the counterpart in infants and young children.

These terms have been criticized by Birch (30, p. 5). Yet the authors using "minimal brain damage" or "minimal brain dysfunctions" apparently have done so in an honest effort to characterize categories of children. These children are *different* in certain learning and behavioral patterns, but when tested individually and comprehensively achieve within the near average, average, or above average ranges of intellectual functioning. The vital implication is that educational programing and rehabilitation for these children must be different than for the brain-damaged mentally subnormal groups.

Response to the cardinal questions: "What shall it be called?" and "Whom shall it include?" will depend upon the acceptance of two basic premises:

1. Brain dysfunction can manifest itself in varying degrees of severity and can involve any or all of the more specific areas, e.g., motor, sensory, or intellectual. This dysfunctioning can compromise the affected child in learning and behavior.

2. The term *minimal brain dysfunction* will be reserved for the child whose symtomatology appears in one or more of the specific areas of brain function, but in mild, borderline, or subclinical form, without reducing overall intellectual functioning to the subnormal ranges. (Note: The evaluation of the intellectual functioning of the "culturally disadvantaged" child, though perhaps related, represents an equally complex, but different problem.)

A review of selected literature revealed a total of 38 terms used to describe or distinguish the conditions grouped as minimal brain dysfunction in the absence of findings severe enough to warrant inclusion in an established category, e.g., cerebral palsies, mental subnormalities, sensory defects. Several methods of grouping these terms are possible, such as:

Group I—Organic Aspects

Association Deficit Pathology (33)
Organic Brain Disease (5, 34)
Organic Brain Damage (35)
Organic Brain Dysfunction (36)
Minimal Brain Damage (38)
Diffuse Brain Damage (39)
Neurophrenia (40)
Organic Drivenness (4)
Cerebral Dysfunction (41)
Organic Behavior Disorder (42)
Choreiform Syndrome (43)
Minor Brain Damage (28)
Minimal Brain Injury (28, 44)
Minimal Cerebral Injury (22)
Minimal Chronic Brain Syndromes (45)
Minimal Cerebral Damage (46)
Minimal Cerebral Palsy (47)
Cerebral Dys-synchronization Syndrome

Group II—Segment or Consequence

Hyperkinetic Behavior Syndrome (48)
Character Impulse Disorder (49)
Hyperkinetic Impulse Disorder (50)
Aggressive Behavior Disorder (51)
Psychoneurological Learning Disorders (52)
Hyperkinetic Syndrome (53 and others)
Dyslexia (54 and others)
Hyperexcitability Syndrome (43)
Perceptual Cripple (55)
Primary Reading Retardation (56)
Specific Reading Disability (57)
Clumsy Child Syndrome (58)
Hypokinetic Syndrome (59 and others)
Perceptually Handicapped
Aphasoid Syndrome
Learning Disabilities
Conceptually Handicapped
Attention Disorders
Interjacent Child

With few exceptions, the most striking omission throughout the literature was the lack of attempt at a definition of the terms used or the condition discussed. Although there is a more than ample supply of terminology and characteristics, there is a shortage of interpretative elucidation.

Notable among so-stated definitions is that of Strauss and Lehtinen (28). Others have approached definition by extensive description (5, 30, 35, 37, 40, 44, 45, 46, 55, 59).

Minimal Brain Dysfunction Syndrome Definition

The term "minimal brain dysfunction syndrome" refers in this paper to children of near average, average, or above average general intelligence with certain learning or behavioral disabilities ranging from mild to severe, which are associated with deviations of function of the central nervous system. These deviations may manifest themselves by various combinations of impairment in perception, conceptualization, lan-

guage, memory, and control of attention, impulse, or motor function.

Similar symptoms may or may not complicate the problems of children with cerebral palsy, epilepsy, mental retardation, blindness, or deafness.

These aberrations may arise from genetic variations, biochemical irregularities, perinatal brain insults or other illnesses or injuries sustained during the years which are critical for the development and maturation of the central nervous system, or from unknown causes.

The definition also allows for the possibility that early severe sensory deprivation could result in central nervous system alterations which may be permanent.

During the school years, a variety of learning disabilities is the most prominent manifestation of the condition which can be designated by this term.

The group of symptoms included under the term minimal brain dysfunction stems from disorders which may manifest themselves in severe form as a variety of well-recognized conditions. The child with minimal brain dysfunction may exhibit these minor symptoms in varying degree and in varying combinations.

Classification Guide, Brain Dysfunction Syndromes

Minimal (*minor; mild*)	*Major* (*severe*)
1. Impairment of fine movement or coordination.	1. Cerebral palsies.
2. Electroencephalographic abnormalities without actual seizures, or possibly subclinical seizures which may be associated with fluctuations in behavior or intellectual function.	2. Epilepsies.
3. Deviations in attention, activity level, impulse control, and affect.	3. Autism and other gross disorders of mentation and behavior.
4. Specific and circumscribed perceptual, intellectual, and memory deficits.	4. Mental subnormalities.
5. Nonperipheral impairments of vision, hearing, haptics, and speech.	5. Blindness, deafness, and severe aphasias.

VI. Symptomatology—Identification of the Child

In a search for symptoms attributed to children with minimal brain dysfunctioning, over 100 recent publications were reviewed.

Many different terms were used to describe the same symptom, e.g., excessive motor activity for age might be referred to as any one of the following: hyperactivity, hyperkinesis, organic drivenness, restlessness, motor obsessiveness, fidgetiness, motor disinhibition, or nervousness.

A large number of terms were too broad for other than limited value, e.g., "poor academic achievement"; others were more specific, e.g., "reading ability two grade levels below grade placement." A few are mentioned one time only, e.g., "inclined to have fainting spells." Others are too general (or judgmental) to classify, e.g., "often good looking." Opposite characteristics are common: "physically immature for age"—"physically advanced for age"; "fearless"—"phobic"; "outgoing"—"shy"; "hyperactive"—"hypoactive."

These examples represent some of the difficulties encountered in developing a scheme for classification of the symptoms, and indicate the variety of syndromes contained within the primary diagnosis of minimal brain dysfunctioning. The following represents an attempt to classify some of the descriptive elements culled from the literature.

Preliminary Categories of Signs and Symptoms

A. *Test Performance Indicators*

1. Spotty or patchy intellectual deficits. Achievement low in some areas; high in others.
2. Below mental age level on drawing tests (man, house, etc.).
3. Geometric figure drawings poor for age and measured intelligence.
4. Poor performance on block design and marble board tests.
5. Poor showing on group tests (intelligence and achievement) and daily classroom examinations which require reading.
6. Characteristic subtest patterns on the Wechsler Intelligence Scale for Children, including "scatter" within both Verbal and Performance Scales; high Verbal—low Performance; low Verbal—high Performance.

B. *Impairments of Perception and Concept-formation*

1. Impaired discrimination of size.
2. Impaired discrimination of right-left and up-down.
3. Impaired tactile discriminations.
4. Poor spatial orientation.
5. Impaired orientation in time.
6. Distorted concept of body image.
7. Impaired judgment of distance.
8. Impaired discrimination of figure-ground.
9. Impaired discrimination of part-whole.
10. Frequent perceptual reversals in reading and in writing letters and numbers.
11. Poor perceptual integration. Child cannot fuse sensory impressions into meaningful entities.

C. *Specific Neurologic Indicators*

1. Few, if any, apparent gross abnormalities.
2. Many "soft," equivocal, or borderline findings.
3. Reflex assymetry frequent.
4. Frequency of mild visual or hearing impairments.
5. Strabismus.
6. Nystagmus.
7. High incidence of left, and mixed laterality and confused perception of laterality.
8. Hyperkinesis.
9. Hypokinesis.
10. General awkwardness.
11. Poor fine visual-motor coordination.

D. *Disorders of Speech and Communication*

1. Impaired discrimination of auditory stimuli.
2. Various categories of aphasia.
3. Slow language development.
4. Frequent mild hearing loss.
5. Frequent mild speech irregularities.

E. *Disorders of Motor Function*

1. Frequent athetoid, choreiform, tremulous, or rigid movements of hands.
2. Frequent delayed motor milestones.
3. General clumsiness or awkwardness.
4. Frequent tics and grimaces.
5. Poor fine or gross visual-motor coordination.
6. Hyperactivity.
7. Hypoactivity.

F. *Academic Achievement and Adjustment* (Chief complaints about the child by his parents and teachers)

1. Reading disabilities.
2. Arithmetic disabilities.
3. Spelling disabilities.
4. Poor printing, writing, or drawing ability.
5. Variability in performance from day to day or even hour to hour.
6. Poor ability to organize work.
7. Slowness in finishing work.
8. Frequent confusion about instructions, yet success with verbal tasks.

G. Disorders of Thinking Processes

1. Poor ability for abstract reasoning.
2. Thinking generally concrete.
3. Difficulties in concept-formation.
4. Thinking frequently disorganized.
5. Poor short-term and long-term memory.
6. Thinking sometimes autistic.
7. Frequent thought perseveration.

H. *Physical Characteristics*

1. Excessive drooling in the young child.
2. Thumb-sucking, nail-biting, head-banging, and teeth-grinding in the young child.
3. Food habits often peculiar.
4. Slow to toilet train.
5. Easy fatigability.
6. High frequency of enuresis.
7. Encopresis.

I. *Emotional Characteristics*

1. Impulsive.
2. Explosive.
3. Poor emotional and impulse control.
4. Low tolerance for frustration.
5. Reckless and uninhibited; impulsive then remorseful.

J. *Sleep Characteristics*

1. Body or head rocking before falling into sleep.
2. Irregular sleep patterns in the young child.
3. Excessive movement during sleep.
4. Sleep abnormally light or deep.
5. Resistance to naps and early bedtime, e.g., seems to require less sleep than average child.

K. *Relationship Capacities*

1. Peer group relationships generally poor.
2. Overexcitable in normal play with other children.
3. Better adjustment when playmates are limited to one or two.
4. Frequently poor judgment in social and interpersonal situations.
5. Socially bold and aggressive.
6. Inappropriate, unselective, and often excessive displays of affection.
7. Easy acceptance of others alternating with withdrawal and shyness.
8. Excessive need to touch, cling, and hold on to others.

L. *Variations of Physical Development*

1. Frequent lags in developmental milestones, e.g., motor, language, etc.
2. Generalized maturational lag during early school years.
3. Physically immature; or
4. Physical development normal or advanced for age.

M. *Characteristics of Social Behavior*

1. Social competence frequently below average for age and measured intelligence.
2. Behavior often inappropriate for situation, and consequences apparently not foreseen.
3. Possibly negative and aggressive to authority.
4. Possibly antisocial behavior.

N. *Variations of Personality*

1. Overly gullible and easily led by peers and older youngsters.
2. Frequent rage reactions and tantrums when crossed.
3. Very sensitive to others.

4. Excessive variation in mood and responsiveness from day to day and even hour to hour.
5. Poor adjustment to environmental changes.
6. Sweet and even tempered, cooperative and friendly (most commonly the so-called hypokinetic child).

O. *Disorders of Attention and Concentration*

1. Short attention span for age.
2. Overly distractible for age.
3. Impaired concentration ability.
4. Motor or verbal perseveration.
5. Impaired ability to make decisions, particularly from many choices.

Several authors note that many of the characteristics tend to improve with the normal maturation of the central nervous system. As the child matures, various complex motor acts and differentiations appear or are more easily acquired.

Variability beyond that expected for age and measured intelligence appears throughout most of the signs and symptoms. This, of course, limits predictability and expands misunderstanding of the child by his parents, peers, teachers, and often the clinicians who work with him.

Ten characteristics most often cited by the various authors, in order of frequency:

1. Hyperactivity.
2. Perceptual-motor impairments.
3. Emotional lability.
4. General coordination deficits.
5. Disorders of attention (short attention span, distractibility, perseveration).
6. Impulsivity.
7. Disorders of memory and thinking.
8. Specific learning disabilities:
   a. Reading.
   b. Arithmetic.
   c. Writing.
   d. Spelling.
9. Disorders of speech and hearing.
10. Equivocal neurological signs and electroencephalographic irregularities.

The "sign" approach can serve only as a guideline for the purpose of identification and diagnosis.

The protean nature of the disability is the obvious conclusion from the approach to symptomatology and identification taken above.

The situation, however, is not as irremediable as it might appear. Order is somewhat salvaged by the fact that certain symptoms *do* tend to cluster to form recognizable clinical entities. This is particularly true of the "hyperkinetic syndrome," within the broader context of minimal brain dysfunctioning. The "hypokinetic syndrome," primary reading retardation, and to some extent the aphasias, are other such examples.

Recognition and acceptance of these specific symptom complexes as subcategories, within the general category of minimal brain dysfunctioning, would facilitate classification and the development of appropriate management and education procedures.

VII. Diagnostic Evaluation and Criteria

The purposes of the diagnostic evaluation are to demonstrate the existence or absence of minimal brain dysfunction, to determine the causative factors of the past or present environment responsible for this condition, to define the specific limitations of physical or intellectual capabilities present, and thus to establish the basis for a logical program of medical and educational remediation.

Diagnostic confusions have developed from a lack of recognition that differences exist in the objectives of the "medical diagnosis" as opposed to the "educational diagnosis." The objective of the medical diagnosis is to demonstrate the existence of any causative factors of disease or injury capable of amelioration or prevention. The educational diagnosis involves the assessment of performance and capabilities. Its objective is to make possible the establishment of appropriate remedial programs of management and education.

Since the nature and objectives of these two forms of examination are different, the following guidelines for examination include a separate section for each.

GUIDELINES FOR THE DIAGNOSTIC EVALUATION OF DEVIATING CHILDREN

A. Medical Evaluation

1. *HISTORIES:*

   a. *Medical.*—To include pre-, peri-, and postnatal information. Details of all childhood illnesses should be obtained, including age of child at time of illness, symptoms, severity, course, and care (such as physician in attendance, hospitalization).

   b. *Developmental.*—To include details of motor, language, adaptive, and personal-social development.

   c. *Family-Social.*—To involve parents, child, and others as indicated. The family-social history should include detailed information regarding family constellation, acculturation factors, specific interpersonal family dynamics, emotional stresses, and traumata.

2. *PHYSICAL EXAMINATION:*

   a. *General.*—To evaluate general physical status and to search for systemic disease. The physical examination should be done as part of the current evaluation of the child, and not obtained at a previous time for some other purpose, e.g., routine preschool checkup or in conjunction with a previous illness. Many child study clinics obtain a report on the "physical status" of the child from the family physician or pediatrician as a part of the referral policy. It is not uncommon, however, for the physician simply to fill out the requested form from his records on the child without conducting a current examination.

   b. *Neurologic.*—To evaluate neurological function and to search for specific disorders of the nervous system. The developmental aspects of neurologic integration assume primary importance for this examination, especially with reference to integrated motor acts as opposed to simple reflexes.

3. *SPECIAL EXAMINATIONS:*

   a. *Ophthalmologic.*—To include visual acuity, fields, and fundi examinations.

   b. *Otologic.*—To include audiometric and otoscopic examinations.

4. *ROUTINE LABORATORY TESTS:*

   a. *Serologic.*

   b. *Urinalysis.*

   c. *Hematologic.*

5. *SPECIAL LABORATORY TESTS (Only When Specifically Indicated):*

   a. *Electroencephalographic.*—To include wake, sleep, and serial tracings.

   b. *Radiologic.*

   c. *Pneumoencephalographic.*

   d. *Angiographic.*

   e. *Biochemical.*

   f. *Genetic assessment: Chromosome analysis.*

B. Behavioral Assessment

1. *ACADEMIC HISTORY.*—To involve child's teachers and principal, with their observations regarding school behavior as well as academic progress and achievement. The child's school records, including samples of schoolwork and test results, should be available to the diagnostic team.
2. *PSYCHOLOGICAL EVALUATION.*—The following items represent the core of the psychological evaluation:
   a. Individual comprehensive assessment of intellectual functioning.
   b. Measures of complex visual-motor-perceptual functioning.
   c. Behavioral observations in a variety of settings.
   d. Additional indices of learning and behavior as indicated.
3. *LANGUAGE EVALUATION.*—Detailed assessment of speech and language behavior. To include audiometric screening; assessment of articulation, voice quality, and rate; and the expressive and receptive aspects of language.
4. *EDUCATIONAL EVALUATION.*—An educational diagnostician should conduct detailed analyses of academic abilities, including achievement assessment for details of levels and methods of skill acquisition; e.g., reading, number concepts, spelling and writing.

A child has not had the benefit of a complete diagnostic evaluation unless he has had both a medical and a behavioral assessment. The medical evaluation is essential to prevent the development or continuation of unsuspected disease processes. The behavioral assessment provides the basis for a logical management and educational program.

Since various types of diagnosis are involved, a given child may appropriately receive several diagnoses. Additional confusion stems from the present lack of a multidisciplinary approach. The diagnosis which receives emphasis may reflect a number of variables including the following:

1. The diagnostician—his discipline, training, experience, clinical talents; his knowledge and attitudes regarding causes in the production of learning and behavior problems in children.

2. The diagnostic setting—academic or clinical; community child guidance center, community all-purpose mental health clinic, medical center child psychiatry clinic, medical center pediatric clinic, or private practice. Clinic orientation might emphasize teaching-training, service, or research.

3. The diagnostic procedure—including such aspects as thoroughness and excellence, in terms of time, number, and varieties of techniques and measures utilized and uni- or multiple-disciplinary approach.

Unfortunately, at the present time a lack of scientific knowledge may make it impossible to provide a precise medical or educational diagnosis. Resort must be made to broad and imprecise diagnostic categories. The development of multidisciplinary diagnostic programs and the continuing increase of scientific knowledge will do much to dispel these existing disturbing uncertainties.

We are dealing with a complex and extensive work-up. Few existing clinics are prepared to provide all the services required by this group of children. There are great advantages in consolidation of effort and concentration of facilities in a single environment.

A more detailed consideration of the means by which these needs are to be met and of the specific management and educational programs which will be required is the subject of a further study to be carried out by Task Force II of this mission. The mission of this task force has been defined as follows:

Task Force II will be responsible for consideration of services including those necessary and desirable to diagnose the medical and health-related problem and to identify the methods of determining educational performance capability and ways of educating afflicted children. The two aspects of the problem are education, and medical and health-related services.

1. Relative to the educational aspects of the problem, the task force will concern itself with problems of educational identification, assessment and evaluation, teaching of children with minimal brain dysfunction, educational techniques and methodologies involved, preparation and certification of teachers, responsibility of the public school system for educating these children, guidance of parents in managing children at home, and public education as it relates to the introduction into society of children with minimal brain dysfunction.

2. Relative to the medical and health-related aspects, the task force will concern itself with methods of identification of children with minimal brain dysfunction, diagnostic services required for obtaining adequate knowledge of the child's ability to perform, and the development of guidelines to be used by appropriate professional persons in conducting and carrying out services necessary to proper management of the child with minimal brain dysfunction.

VIII. Bibliographies

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